Web Engineering and The BaBar Web
30 April 2003

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University of Western Sydney
Agenda

- Introduction
- Myths, realities and challenges of Web development
- An overview of the BaBar Web
- Web Engineering: Introduction
- Web development maturity model
- Review of current Web development approaches
- Non-technical issues: policies, procedures, management
- Web auditing
- Summary findings of the BaBar Web Review
- Web re-engineering
- Conclusion and Future Directions
Introduction
Looking back…

- SLAC seminar in December 2000
- Loosely translated from Sanskrit:
  
  *My first contact with knowledge made me feel*
  
  *That I had embarked on a world conquest and I knew it all*
  
  *As I came into contact with wise people (who knew far more and were humble for that)*
  
  *I realised that I was a mere fool*
  
  …
some tenets

• observations and experiments as basis
• more than one way to do it. (Perl philosophy)
  – to do it right!
• this is also a corollary of what the physicists do
  – If it needs doing, a physicist will not wait for someone
    else to do it
• counterpoint - many more ways to do it wrong
  – apply to everything - tools, technologies, techniques,
    methodologies, even solutions to problems
tenets (2)

• even simple rules lead to complex behaviour (Wolfram, *New Science, 2002*)
• consolidation of collective experience
• hence, constant questioning:
  – how do you and others do Web development?
  – when it comes to the Web, how do you know you’re doing it right?
  – can it be ‘improved’?
We never do anything well till we cease to think about the manner of doing it.

- William Hazlitt
myths, realities and challenges of Web development

(the backdrop)
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td>More information</td>
<td>Focused information</td>
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<tr>
<td>Static information</td>
<td>Dynamic information</td>
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<tr>
<td>Collecting information</td>
<td>Sharing information</td>
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<td>Automation and support</td>
<td>Integration and coordination</td>
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<td>New technology</td>
<td>New applications of technology</td>
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<td>Information age</td>
<td>Communication age</td>
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<tr>
<td>Words and numbers</td>
<td>Data and voice and video</td>
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## Shifting Focus of IT and Apps (2)

<table>
<thead>
<tr>
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<tr>
<td>Data processing</td>
<td>Decision processing</td>
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<td>Fit user to interface</td>
<td>Fit interface to user</td>
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<td>Proprietary systems</td>
<td>Open systems</td>
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<td>Programming by programmers</td>
<td>Programming by users</td>
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<tr>
<td><em>Infrastructure</em></td>
<td><em>Infostructure</em></td>
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</table>

*(Burrsus and Gittins, 1994)*
Application Development

- People
- Procedures
- Data (Information)
- Technology
- … (in no particular order at this stage)
People (end-users)

- user-ignored
- user-acknowledged
- user-tolerated
- user-interfaced
- user-driven (end-user computing)
- user-involved
end-users can’t win

new technologies are introduced even before users can work comfortably with the current one

new words and acronyms are flying around all the time

no one will train them, except at the most elementary level ...

(3M model? – set aside 10% of your time to explore or even do nothing!)
The Web

• not just a publishing medium but
  – a new environment for the development and deployment of new applications

• Web-based systems “involve a mixture between print publishing and software development, between marketing and computing, between internal communications and external relations, and between art and technology” (Powell, 1998)
Perspectives on the Web

- Academic (IT)
- Academic (non-IT)
- Government
- Business and Industry (IT)
- Business and Industry (non-IT)
- Professional bodies (IT)
- Other professions?
- Users
Disciplinary Perspectives

• Graphic design and information design
• Information and library science
• Journalism
• Usability engineering
• Marketing
• Computer Science
• Technical writing
• Architecture
• Product management
• Information Systems
• Software Engineering
• Information Management
• Hypertext community
• …
Web-based Applications

• In no particular order!
  • Graphic Design  
  • Information management  
  • Document management  
  • Link management  
  • Information ownership  
  • Multimedia  
  • Screen base vs paper  
  • Legal (copyright) issues 

  • Software platforms (versions!)
  • Hardware (capabilities)
  • HTML, XML, CSS, …
  • Standards, protocols, tools
  • Design of Web sites
  • Design of Web pages
  • Programming
  • Network performance

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Web-based Applications (2)

- Maintenance
- Ethical (privacy) issues
- Accuracy, reliability
- Temporality
- Responsibility
- Virtual organisations
- Life long learning!
- Team work

- Security
- Distribution of resources
- Development methods
- Testing
- Problem solving
- Project work
- Types of applications
- Basic skills?!
Web Site Design (1)

Visible Characteristics

• **What is the purpose?** Collection of pages?
• Functionality
• Structure
• Performance
• User identification
• Feedback
Web Site Design (2)
Invisible Characteristics

• Document management
• Link management
• Security
• Infrastructure
• Information structure
• Information management
• Database Connectivity (dynamic pages)
• Dynamic pages
• Dynamic content
Web Site Design (3)
Invisible Characteristics

• Maintenance
• Standards
• Upgrades/service
• Organisational issues
• Information ownership (ODER)
• Legal and copyright issues (Music industry, Shetland newspapers)
• Social and ethical issues (lies, propaganda)
• User profiles
Web Reality (1)

(need to understand contributory disciplines plus)

• Technologies
• Tools
• Techniques
• Methodologies
• (and introduce) innovations
• ...

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W3C Initiatives (1)

- Accessibility Annotea CC/PP
- CSS Validator Device Independence
- DOM HTML HTML Tidy
- HTML Validator HTTP Internationalization
- Jigsaw Libwww MathML
- Micropayments Mobile Patent Policy
- PICS PNG Privacy and P3P
- Quality Assurance (QA) RDF
- Semantic Web SMIL SOAP
W3C Initiatives (2)

- Style      SVG      TVWeb
- URI/URL    Voice    WAI
- WebCGM     XForms   XHTML
- XLink      XML      XML Base
- XML Encryption XML Protocol XML Query
- XML Schema XSL Signature Xpath
- XPointer   XSL and XSLT
### Others

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<tbody>
<tr>
<td>Sockets</td>
<td>IP</td>
<td>TCP</td>
</tr>
<tr>
<td>JavaScript</td>
<td>VBScript</td>
<td>CGI</td>
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<tr>
<td>JSP</td>
<td>ASP</td>
<td>PHP</td>
</tr>
<tr>
<td>SQL</td>
<td>JDBC</td>
<td>database servers</td>
</tr>
<tr>
<td>Web servers</td>
<td>servlets</td>
<td>UML</td>
</tr>
<tr>
<td>ASP</td>
<td>ADO</td>
<td>COM/DCOM</td>
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<tr>
<td>CORBA</td>
<td>RMI</td>
<td>Jini</td>
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<tr>
<td>LDAP</td>
<td>.net</td>
<td>...</td>
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</table>

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Web Development (1)

• problems
  – deceptive simplicity of page creation
  – confusion between page construction, page design, site design, application development
  – ‘end user computing’
  – marketing tactics of software industry
No Problem! (1)

- Welcome to NetObjects Fusion! Since its debut, NetObjects Fusion has been the pioneer of the site-wide approach to creating and managing Web sites. (An approach that other systems are still trying to copy!) You can use NetObjects Fusion to plan, build, and publish your business Web site effectively.
- Map out your site quickly and easily
- Enjoy complete page layout control
- Make global style changes in seconds
- Build links automatically as you work
No Problem! (2)

- Add exciting interactive features
- Incorporate dynamic database publishing, e-commerce and more
- Get over $300 in FREE bundled software

Explore the benefits of NetObjects Fusion, and you'll see why it's the fastest, easiest way to create business Web sites!
Web Development (2)

• What may go wrong
  – business model (Web as a marketing brochure)
  – project management (outsourcing)
  – information architecture
  – page layout (graphics for ‘good looks’)
  – content authoring (Web vs print medium)
  – linking
Issues

- Ad-hoc development
- lack of disciplined approaches
- need for new methods and tools
- understanding of special features of the medium
- legacy systems
- multimedia
- user-centric development
- new types of applications
- …
- Education
An overview of the BaBar Web
BaBar – A Community Web Site in an Institutional Setting

Ray Cowan (SLAC), Yogesh Deshpande (UWS), Bebo White (SLAC)
for the BaBar Computing Group

CHEP’03
March 28, 2003
Overview

• We propose that management and maintenance of the BaBar Web site can be modeled as a virtual community

• This BaBar community must co-exist with that of the hosting institutional Web site (SLAC) and its policies and procedures
Scope of the BaBar Web

- UNIX/Apache/AFS; some content on IIS servers

**Size:**
- Documentation - ~30-35 GB; recent growth rate of ~200 MB/week
- HyperNews - ~4-5 GB; ~120K postings; 80-100 postings/day (average), 24 x 7
- PubDb – Oracle publications database, ~5 GB
- Code base – Program source code library, ~30 GB
Goals of a Virtual Community/Web Site

• A virtual community’s knowledge has both **explicit** and **implicit** components

• A virtual community requires collaborators to communicate **asynchronously**

• A virtual community supports the ability of **computing** to represent information with new **tools** allowing a broad range of different people to understand complex or conceptual information and **participate** in exploring it
Goals of a Virtual Community/Web Site (cont)

• A virtual community indicates an organizational (or community) structure that is flexible enough to optimize individual and group performance under new and changing conditions.

• A virtual community should create a sense of sharing experience, perspective, support, and trust between people working toward similar goals or solving problems together.
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BaBar Public Information & Visitor Pages

The BaBar detector was built at SLAC to study the millions of B mesons produced by the PEP-II storage ring. The BaBar Collaboration consists of approximately 600 physicists and engineers from 75 institutions in 10 countries. This website is hosted at SLAC and RAL. Employment: [Employment Opportunities in High Energy Physics] <[Employment Opportunities at SLAC] -> [Employment Opportunities at SLAC]

Links for new "BaBarians": [Offline workbook] [BaBar web info] [Computer Access] [SLUO]

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External links: [HEPIC] [Databases] [PDG] [HEP preprints]
Collaborator/Physicist Produced Information

- Static reference information – HTML, PostScript, PDF, text, Powerpoint, Excel, etc.
  - Physics analysis documentation – physics only
  - Publications
  - Presentations and talks
  - Detector operations and maintenance
  - Computing
  - Physics analysis – includes computing details
  - Planning
  - General interest (e.g., scientific knowledge and advances)
  - Education information (e.g., photos, etc.)
  - Measures of performance (e.g., for funding)
  - Workbook – “Getting Started in BaBar,” FAQ
  - Doxygen – hyperlinked documentation of code base library
Collaborator/Physicist Produced Information (cont)

- Dynamic information
  - Daily communications (*HyperNews*)
  - Detector operation (electronic logbook)
  - Detector monitoring (performance graphs)
  - Performance statistics
  - *CVSWeb* – software management, revision tracking
BaBar Authoring *Modus Operandi*

- **Goal** – To enable occasional, non-professional authors to effectively produce and publish content that is tool independent and meets accessibility standards (*comments?*)
- **Method**
  - Minimalist approach to page authoring
    - A minimum of professionally designed graphics
    - Basic HTML
    - Minimal client-side programming (e.g., DHTML)
    - Navigation via standard BaBar wrapper
    - Infrequent use of style sheets
For Which Issues Might a Community Model Help?

- Authoring of Static HTML Pages
  - Possible solution: the BaBar “MO”

- Maintenance of Static HTML Pages
  - Low interest in writing documentation – “Catch-22”
  - No strong sense of responsibility for documentation at the group level
  - We are a collaboration: no authority to ‘make’ people maintain content
  - Possible solution: Web core pages proposal

- Security
  - Usually involves an ‘us’ vs. ‘them’ situation
  - Need to find alternative, collaborative, cooperative approaches to reduce risk (e.g., training)
  - Example: Usage of softlinks
  - Possible solution: ?
Future Work

- What are metrics for community Web site performance?
- What metrics can be applied to the BaBar Web site?
- How can “usage patterns” be matched to the “production/consumption” model?
- What generic community-based tools might be applicable to the BaBar Web?
- What BaBar-specific community-based tools could be developed?
Web Engineering: Introduction
Evolution of Web-based Systems (1)

- pages: from simple, static to complex, dynamic
- information: from static to dynamic, customised
- larger volume of information
- navigability: more complex
- development: larger teams with expertise in diverse areas
Evolution of Web-based Systems (2)

• increased interactivity and functionality:
• integration with database and other planning, scheduling and tracking systems
• high performance and continuous availability essential
• need: risk assessment and management, configuration control and management, project plan and management, ...
## Categories of Web-Based Systems

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>‣ <strong>Informational</strong></td>
<td>Online newspapers, product catalogues, newsletters, manuals, reports, online classifieds, online books</td>
</tr>
<tr>
<td>‣ <strong>Interactive</strong></td>
<td>Registration forms, customized information presentation, online games</td>
</tr>
<tr>
<td>‣ <strong>Transactional</strong></td>
<td>Electronic shopping, ordering goods and services, online banking,</td>
</tr>
<tr>
<td>‣ <strong>Workflow oriented</strong></td>
<td>Online planning and scheduling, inventory management, status monitoring, SCM</td>
</tr>
<tr>
<td>‣ <strong>Collaborative work environments</strong></td>
<td>Distributed authoring systems, collaborative design tools</td>
</tr>
<tr>
<td>‣ <strong>Online communities, marketplace</strong></td>
<td>Discussion groups, recommender systems, online marketplaces, online auctions</td>
</tr>
<tr>
<td>‣ <strong>Web portals</strong></td>
<td>Electronic shopping malls, online intermediaries</td>
</tr>
<tr>
<td>‣ <strong>Web services</strong></td>
<td>Enterprise applications, business intermediaries</td>
</tr>
</tbody>
</table>
Web Engineering Activities

- Requirements specification and analysis
- Web-based system analysis and design
- Web development methodologies and techniques
- Migration of legacy system to Web environments
- Web-based real-time applications development
- Web-based multimedia application development
- Testing, verification and validation techniques and tools
- Quality assessment, control and assurance
- Management of access to applications and privileges
- Configuration and project management
- "Web metrics" - metrics for estimation of development efforts
- Performance specification and evaluation
- Update and maintenance
- Development models, teams, staffing
- Human and cultural aspects
- User-centric development
- Graphics, animation and streaming
- Copyright, legal and social aspects
Stages of Web Development

1. Web Page Construction
2. Web Page Design
3. Web Site Design (default entry point)
4. Web Site Construction
5. Web-based System
6. Web project planning and management
7. Research projects
factors affecting Web development

• the initial purpose
• the technologies used
• the customers’ expectations
• the competitors’ performance
• the desire to become a ‘Web-based organisation’ and
• the systematic approach or its lack.
Web Engineering (1)

- Engineering: art or profession of designing or making, or putting to practical use, engines of machinery of any type (Chambers)

- Software Engineering: concerned with software systems which are built by teams rather than individual programmers, uses engineering principles in the development of these systems, and is made up of both technical and non-technical aspects. … the software engineer must be able to communicate, both orally and in writing. (Sommerville)
Web Engineering (2)

• Consensus: no single methodology
• success factors:
  – purpose and functionality
    • scope, size, complexity
  – content
  – graphic design
  – performance
  – ...

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Web Engineering (3)

• Other factors
  – document orientation
  – navigational design
  – changing technology
  – budget and time constraints
  – people and internal politics
  – divide between theory and practice
  – lack of understanding ...
Web Engineering

- A holistic and proactive approach to Web systems development.
- Offers systematic approaches and disciplined processes for development.
- Deals with the management of complexity and diversity of Web development.

- It can bring potential chaos in Web-based system development:
  1. under control
  2. minimise risks
  3. enhance maintainability and quality
Engineering Principles

- Well-defined goals/requirements.
- Development of a product in phases.
- Careful planning of these phases.
- Systematic design and development.
- Continuous audit of the whole process.
- We learn by practice, optimisations follows repetitions
  - Hence, engineering here could be interpreted as establishing principles and a body of knowledge that draws upon the collective experience
Garden Analogy

- Like gardens, Web-based systems continue to evolve, change and grow.
- Web-based systems are growing systems.
- Good initial infrastructure is required to allow growth in a controlled, but flexible manner, and to foster creativity, refinement and change.
Web Development: An Event or a Process?

• Developing a Web site is not an event, it is a process.
Overall Development Process

- Context Analysis
- Product Model
- Process Model
- Project Plan
- Web Site Development
- Web Site Maintenance

Source: Athula Ginige
Context Analysis

• Context
  – Identify the stake holders and their broader requirements and experiences.
  – Identify the corporate requirements in relation to look and feel, performance, security and governance.

• Content
  – Establish what information needs to be on the web site, how to get this information and how often this information is changing (immediate, short term, medium term)
  – Identify the functions the Web site needs to provide (immediate, short term, medium term).

• Users - potential users, their characteristics and needs.
  – (cf information ecology from Information Architecture)
Requirement Specification

- Client's req. analysis
- Content & Boundary analysis
- User analysis
- Implication analysis
- Constraint Analysis
- Feasibility analysis

General Description

Information Requirements

Non-Functional Requirements

Acceptance Criteria

User Profile

Functional Requirements

Development Requirements

System Requirement Specification
Design Process

Requirement Specification

Experience

Non Technical Issues

Technology Issues

Cognitive Issues

Information Structure

Information access methods

Look and Feel

Guidelines for Content Development

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Project Plan

• A project plan and time schedule is developed to implement the sub-processes.
• Use the well-developed techniques for project planning used in conventional engineering.
• Based on the project plan, development activities can take place.
Concept of the "ilities"

- People use terms like scalability, reliability, and availability to describe how well the system meets current and future service-level expectations.
- These *ilities* characterize an IT solution's architectural and other qualities and are critical.
- A convenient way to think about *ilities* is to consider the role they play in the solution architecture.

- They generally fall into four categories:
  - Strategic
  - Systemic
  - Service
  - User

Strategic ilities

How well does a solution meet business requirements?

• **Scalability**: how well an architecture can grow, as traffic, demand for services, or resource utilization grows.

• How you scale will affect many other system qualities. For example, horizontal and vertical scaling will each affect manageability differently.

• **Flexibility** is the extent to which the solution can adapt as business requirements change. Several dot-coms have morphed dramatically in a short time.

• A flexible architecture facilitates greater reusability and quicker deployment.
Systemic ilities

They focus on systems-level operational aspects

• **Manageability** addresses the ease with which IT professionals can handle the solution on a tactical or day-to-day level.

• **Security**, or … "securability", is similar to manageability in the way it affects the solution. As the solution's complexity increases, maintaining security becomes increasingly more difficult.

• Other systemic qualities include **reproducibility** (backups and restores) and **documentability** (useful documentation of the solution).
Service ilities

These ilities address runtime, systems-level issues that affect service..

- **Availability** affects service at many levels. It defines the extent to which a client can access and use the solution.

- It actually addresses the broader problem of whether the client can do all the work needed with the solution.

- Is a system available if, for example, a customer can view a catalog online but can't make a purchase because there are no open sockets to the database?

- **Performance** addresses the critical measures of system delivery.
User ilities

• What presentation layer and client qualities affect the user?
• *Usability* issues concern the many person-machine interface problems.
• The coolest and best technology in the world is useless if the users can't interact with the solution.
• *Accessibility* is maturing as a concept to embrace making solutions accessible to users anywhere at any time.
• It describes the end user's modes for accessing the solution.
Ilities: Summary

- They are far more than just simple marketing hype.
- They are complex and describe the system qualities.
- They interact with and affect one another in several different ways.
- Until you actually build and test a solution, adequately and comprehensively assessing the ilities will be difficult.
- The ilities are an ongoing concern that every e-Biz developer should address.
Review of current Web development approaches
A slight change in the proceedings

• No lecture!
• JWE issue 1 (photocopy of a paper)
• Various conference proceedings
• But
Agile methods, eXtreme Programming, …

• “… we have found XP methods to be especially helpful in three key areas:
  – Project estimating
  – Customer relationships
  – Release planning

also

- (personal belief) human beings generally reach an optimum level in their repetitive work
- At SLAC, having observed and talked to the people, it will be a bold person indeed who would prescribe anything new!
- It may be enough to alert/remind people to the special characteristics of Web development from time to time
- To be persuasive, one will have to demonstrate...
Web development maturity model
case study (1)

- Two major dimensions of hypermedia apps
  - focus: presentation to structural
  - size: small to large
  - additional dimensions (but associated with focus and size): lifespan (short, long) and development approach (ad hoc, evolutionary)

- case study as a narrative: 5Ws and 1H
case study (2)

- Why: focus
- what: size and lifespan
- how: development approach
- where and when: case study
- who?
  - ‘Web developers’ (assumption)
  - end users!
case study (3)
case study (4)

- **Stage 1 (‘infancy’)**
- **progression:** IT services, Research Office, Library, B&T, ODER
- **outcomes**
  - small ‘islands’ of information
- **characteristics**
  - focus: presentation
case study (5)

- Characteristics (contd)
  - size: small
  - lifespan: short
  - process: one-off
  - developers: enthusiasts, amateurs
  - user analysis: absent
  - scalability: none
  - maintainability: minimal
case study (6)

- Stage 2 (‘early childhood’): B&T
- outcomes
  - elaboration of term ‘user’
  - conscious comparison with software development
    - reactions from different people
- characteristics
  - focus: presentation
case study (7)

- Characteristics (contd)
  - size: medium
  - lifespan: medium term
  - process: evolutionary developers: IT experts and enthusiasts
  - user analysis: absent but elaboration of ‘users’
  - scalability: none
  - maintainability: some
case study (8)

• Stage 3 (‘growing up’): B&T

• outcomes
  – dynamic site, Web applications (in B&T)
  – unchanged elsewhere

• characteristics
  – focus: structural and presentational
  – size: medium to large
case study (9)

• Characteristics (contd)
  – lifespan: long (in Web chronology)
  – process: evolutionary
  – developers: Web ‘professionals’
  – user analysis: some, of both ‘passive’ and ‘active’ users
  – scalability: recognised as an issue (some)
  – maintainability: improved
case study (10)

- **Stage 2 (‘adulthood’): UWSM**
- **Outcomes**
  - Web committee (team) at top level
    - formulation of seven projects, policies, procedures
    - understanding of processes
- **characteristics**
  - focus: structural and presentational
  - size: medium to large (project dependent)
case study (11)

• Characteristics (contd)
  – lifespan: long
  – process: evolutionary developers: Web
    ‘professionals’
  – user analysis: some, recognition of need for
    more detailed analysis
  – scalability: planned
  – maintainability: planned
Non-technical issues: policies, procedures, management
Non Technical Issues

- Privacy
- Copyright
- Intellectual property
- Paradigm shift
- Corporate commitment
- Organizational policy and procedures
- Human Resources Development
- Training and education
Web auditing
Web Auditing

• Web site auditing can be carried for quality assurance of new Web system or for evaluating adequacy of an existing system and to make recommendations to improve and reengineer the system.
• As the Web-based system evolves to meet the changing needs, there is a growing demand for redesigning the existing Web sites.
• *Web auditing is the first step toward Web site reengineering* and forms an integral part of the reengineering strategy.
Web Auditing

Web site auditing mostly includes:

- Site functionality
- Information design
- Creative design
- Marketing and promotion
- Measurement
- Performance and usability
- Standards and methods
Web Auditing

The Web site auditing process consists of three major phases:

- Information Collection
- Analysis
- Findings and recommendation
A Case Study
“how can we improve our Web site?”

• a small to medium enterprise (SME) company -
  – static, small, informational Web site
  – good but ‘quirky’ design (a UWS graduate!)
  – objectives:
    • help customers define their requirements
    • reduce workload of marketing staff
    • handle repetitive and simple queries
  – ‘quirkiness’ flowed from objectives
evaluation of the Web site

- search engines
- Australia yellowpages online
- 200 entries
- 16 URLs, 14 active
- mostly static, informational and small
- analysis of common and unique features
- (not the end of this story!)
overview

• regional dimension (Western Sydney)
  – 72,000+ SME companies
  – technologically advanced but inadequate in using IT in offices
  – Internet usage - mainly email
  – shortage of IT professionals

• global dimension?

• Web evolution
defining the exercise (terminology)
review? analysis? evaluation? audit?

• Auditing standard AUS 106
  – The auditing services:
    ▪ “involve systematic examination for which audit-based skills are required;
    ▪ can be applied to an accountability matter that is capable of evaluation against suitable criteria; and
    ▪ result in an independent, written report that provides assurance or information from which the user can derive assurance.”
Audit, Review and Agreed-upon procedures

• **Audit** (high level assurance)
  1. positive endorsement that all assertions made by the audited party are true.

• **Review** (moderate level of assurance)
  – the auditors certify that they have seen *no* evidence that will contradict the statements made by the auditee.

3. **Agreed-upon procedures** (no assurance)
  1. only *factual findings* of reviews of procedures that the auditor and auditee agree upon prior to the examination.
audits in general (1)

• (AUS 106) audits cover both the processes and their outcomes, i.e. products

• Information Systems Auditing (ISACA)
  – processes and products
  – certification programmes
  – not mandatory
audits in general (2)

• ISO 9000 standards
  – “improvement and not inspection of one’s performance”
  – discipline-specific audits (quality, environment, safety etc)
  – *processes, not products*
  – carried out by certified professionals
Web Site Auditing

- site evaluation, Web site quality evaluation and Web site auditing

- agreed-upon procedures, not audit (according to AUS 106 standard)

- W3C (HTML, CSS)
- IEEE Computer Society (IEEE 2001)
Issues in Web Site Auditing

• purpose
• evolutionary nature of the Web
• introduction of new technologies before the ‘old’ ones have stabilised
• the lack of standard processes for developing and maintaining Web sites and Web-based systems
• the lack of appropriate tools and techniques, hampering development of stable methods
• the need for frequent re-design and re-engineering
Brief for Web Site Auditing

- go beyond the site design, construction and maintenance
- cover business, technical, and creative elements of the Web site as well as content (as necessary)
- Strategy for evolution
- develop a framework
- establish legal parameters
Framework for Web Site Audits

- Site functionality
- Information design
- Creative design
- Marketing and promotion
- Measurement
- Performance and usability
Conclusions

• clarification of terminology
• identification of levels of maturity against which an organisation’s site may be judged
• linking of the auditing exercise to the evolution of Web development in an organisation
Summary findings of the BaBar Web Review
Web re-engineering
Conclusion and Future Directions
• Nielsen estimates a cost of $100 billion per year world-wide in lost employee productivity

• Usability is not the only determinant for the success of a Web site or an intranet, and IA is not the only one for usability but ignore them at your peril

• Personal IA (to teach school students), corporate IA – does that mean we can have a group IA?

• (Rosenfeld, L and Morville, P (2002)– IA 2nd ed, foreword by Nielsen)
Nielsen’s usability criteria
(www.useit.com/alertbox/readingmetrics.html)

- Task time - find answers to specified questions
- Errors – wrong answers to questions
- Memory – recognition memory and recall memory
- Time to recall site structure – draw a site map
- Subjective satisfaction – quality, ease of use, likability, user affect
- No critique of his work here, he does say to use these as necessary and assign arbitrary weights to them – so, how well do they apply here?
measurements

- Observations and experiments – basic to science
- What do we measure? Why?
- Physical – # people, # policies and procedures, # types of documents (formats), # documents, # servers, # volumes/folders, # technologies in use, # projects, organisational structure,
Measurements

• Physical measurements may be useful in calculating/estimating accessibility, one dimension of complexity

Use (1)

• Users
  – Passive (take information as is)
  – Active (add to what there is)
    • How will they add – same problems as authors face
  – Interactive (ask questions: as they read, later)
    • Anticipate questions, provide answers – subset of problems that authors face
  – Other demographic characteristics
    • Including technological preparedness
Use (2)

- Usage
  - Actual and anticipated patterns
  - More than detailed log analysis
    - Logging formats
  - Policies for archiving less used material
  - $f$(usefulness, usability, e)
Use (3)

• **Usefulness**
  
  $f$ (content, reliability, accessibility, readability, navigability, e)
Use (4)

- Usability
The best way to predict the future is to invent it!

Alan Kay
Cultural Barriers to Web Use

- Images and Icons – sensitive to national and cultural symbolism, country-centric use.
- Text layout – bi-directional languages require left to right readability (e.g., Arabic).
- Syntax – sentence construct & use of punctuation (e.g., quotation marks).
- Character Set - support for all characters in non-English languages.
- Semantics – local terminology, sentence structure, & writing style (formal versus informal).
- Reading and Comprehension – word choice and sentence structure.
- Use of Color – sensitivity to national symbolism & readability.
- Font Size & Style – readability of character set.
- Search Mechanisms – search capabilities on non-English words.
- Labels – translation of common English words (e.g., GO, CANCEL, SEARCH) to native language.

Source: Shirley Becker
Summary

• Web development has multiple dimensions.
• Both technical and managerial personnel have to recognise and address these dimensions.
• Web engineering encompasses these dimensions and offers a holistic and proactive approach to creating Web applications.
• Web engineering needs to further evolve and mature to effectively handle unique challenges that Web-based systems and applications pose.
• To establish Web engineering as a successful and evolving discipline that is widely understood and practiced more work needs to be done.
• Active participation of researchers, academics and practitioners is required to advance the Web engineering discipline through research, education and practice.
Usability Guidelines

• Simple and natural dialogue
• Speak the users’ language
• Minimize the users’ memory load
• Consistency
  – Visual look
  – Command semantics
  – Conceptual model
Usability Guidelines (cont)

• Feedback
• Clearly marked exits
• Shortcuts
• Good error messages
• Prevent errors
• Help and documentation
In Summary-
The Ten Usability Principles

1. Motivate
   – Design site to meet specific user needs and goals
   – Use motivators to attract different user “personae” in specific parts of the site
2. User Taskflow

– Who are the users?
– What are their tasks and online environment?
– For a site to be usable, page flow must match workflow
Perceiving the Audience/User

- Is it a captive audience? (e.g., an intranet) - then it’s easy….otherwise
- User surveys/user feedback mechanisms
- Analysis of legacy audience information
  - public affairs office
  - customer support, technical support, etc.
  - legacy online systems
Perceiving the Audience/User (cont)

- Lessons learned from non-Web methods - e.g., brochures, catalogs, mailings
- Demographic information - e.g., geography, online, education, etc.
- Sampling - population samples, “beta” testers
- Experience
- Definition of a new audience
3. Architecture
   – 80% of usability
   – Build an efficient navigational structure
   – “If they can’t find it in three clicks, they’re gone”
4. Affordance Means Obvious
   – Make controls understandable
   – Avoid confusion between logos, banners, and buttons
5. Replicate

- What works - “Don’t re-invent the wheel”
- Use well-designed templates for the most common page types (e.g., personal home pages)
- Look at other sites
  - Competitors
  - Classics
    - Google.com
    - Yahoo.com
    - Amazon.com
6. Usability Test Along the Way
   – Test users with low-fi prototypes early in the design process
   – Don’t wait until too close to site launch
7. Know the Technology Limitations
   – Identify and optimize for target browsers and user hardware
   – Test HTML, JavaScript, etc. for compatibility
8. Know User Tolerances
   – Users are impatient
   – Design for a 2-10 second maximum download
   – Reuse as many graphics as possible so that they reload from cache
   – Avoid excessive scrolling
9. Multimedia

– Be discriminating
– Good animation attracts attention to specific information, then stops
– Too much movement distracts reading and slows comprehension
10. Site Statistics
   – Monitor site traffic
   – Which pages peak user interest?
   – Which pages make users leave?
   – Adjust according to analysis results
• “The methodology of computer engineering is to break a problem into smaller and smaller parts, until each part is easily solvable. … problem into units, … unit into functions, … function into steps, … step into sequences, … sequence into an itsy-bitsy task that could be completed before lunch.”

Po Bronson (1997), *The First $20 Million Is Always The Hardest*
Comments and Discussions

• Web as an innovation for an organisation
• focus on product and processes
  – top management is generally product oriented
• open questions
  – ‘traditional’ IT and general management are not in a position to make informed judgments!
  – Organisational differences are insufficiently explored
  – “an activist’s” agenda? ...